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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,742	07/28/2003	Yasuo Aotsuka	0649-0904P	3834
2292 7590 02/26/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER TRAN, NHAN T	
			ART UNIT 2622	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

AK

Office Action Summary

Application No.

10/627,742

Applicant(s)

AOTSUKA, YASUO

Examiner

Nhan T. Tran

Art Unit

2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2008 and 17 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/17/2007 and 1/17/2008 has been entered.

Response to Arguments

2. Applicant's arguments filed 12/17/2007 with respect to claims 2-16 has been fully considered but they are not persuasive.

The Applicant asserts that:

(i) Hunter does not disclose or suggest a fourth filter for transmitting a light having at least a wavelength in the vicinity of 520 nm or in the vicinity of 580 nm, the fourth filter being mounted on the second pixel as required in claim 4 (remarks, page 6 & 7).

(ii) Nonaka does not disclose or suggest a filter for transmitting a light having at least a wavelength in the vicinity of 520 nm or in the vicinity of 580 nm, the filter being mounted on a pixel, so that a signal charge output from this pixel is used to distinguish a light source type as required in claims 14 and 15 (remarks, pages 8-9).

(iii) Juen and Ishimaru do not disclose or suggest a light source type distinction sensor that distinguishes whether a light source in photographing is the sunlight or the specific light source based on a signal charge output from a pixel mounted with a filter, the filter transmitting a light having at least a wavelength in the vicinity of 520 nm or in the vicinity of 580 nm (remarks, pages 9-10).

In response, the Examiner understands the Applicant's arguments but respectfully disagrees for the following reasons:

(i) Since the claim broadly recites "in the vicinity of 520 nm or in the vicinity of 580 nm", the disclosure of Fig. 8 and col. 3, lines 38-43 indicates that the IR filter has a wavelength approximately 600 nm which is in the vicinity of 580 nm (not necessary to be exact 580 nm). Thus, the Examiner submits that Hunter still meets the limitations of claims 2-4, 11-13 and 16.

(ii) Nonaka is not relied upon for the teaching of the wavelength in the vicinity of 520 nm or in the vicinity of 580 nm because this has been taught by Hunter. Nonaka is relied upon for the teaching of using ratio of the output signal values as stated in the previous office action. Therefore, the combination of Hunter and Nonaka has also met the limitations of claims 14 & 15.

(iii) It is clearly seen from Juen that output pixel values from the image sensor are processed to detect a light source as being sunlight or incandescent lamp (col. 2, lines 32-35), wherein at least one pixel has a filter for transmitting a light having at least a wavelength in the vicinity of 520 nm or in the vicinity of 580 nm (see Juen, Fig. 4; col. 2, line 63 – col. 3, line 29; col. 4, lines 6-11, 55-64). It is also seen from Ishimaru that

the digital camera uses output signals from at least one pixel (i.e., a pixel of sensor 17 in Fig. 2) to distinguish a light source in photographing as sunlight or specific light source (i.e., artificial light source), wherein the at least one pixel has a filter for transmitting a light having at least a wavelength in the **vicinity** of 520 nm or in the **vicinity** of 580 nm (see Figs. 2, 4A-4F, 12A-12D and col. 5, lines 4-14; col. 6, lines 34-54).

At least in view of the above, the rejections of claims 2-4, 11-16 are maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 2-4, 11-13 & 16 are rejected under 35 U.S.C. 102(a) as being anticipated by Hunter et al. (US 6,515,275).

Regarding claim 4, Hunter discloses an image pick-up apparatus (a digital camera; col. 1, lines 6-12) comprising:

an optical lens system (the digital camera inherently includes a lens system);
a solid-state image pick-up device (photo sensor array) that converts a light signal incident through the optical lens system into an electric signal (see Figs. 4 & 5;

col. 1, lines 6-12 and col. 3, lines 11-29), the solid-state image pick-up device comprising

first pixels (R, G and B pixels shown in Fig. 5) that are used to pick up a color image (see col. 3, lines 25-29, wherein a color image of three primary colors red, green and blue is picked up by the color sensor array of the digital camera), a second pixel (infrared pixel indicated by I pixel in Fig. 5) disposed in a predetermined region of the solid-state image pick-up device, the second pixel being used for distinguishing a light source type (Fig. 9 and col. 3, line 44 – col. 4, line 11 in which the infrared pixel is used for determining a light source type such as fluorescent light, daylight and tungsten light in conjunction with R, G and B pixels), first to third filters (green, red and blue filters) mounted on the first pixels (Fig. 5; col. 3, lines 30-32), a fourth filter (infrared filter) for transmitting a light having at least a wavelength in the **vicinity** of 580nm, the fourth filter being mounted on the second pixel (see Fig. 8; col. 3, lines 30-44, wherein the infrared filter clearly transmits a light having a wavelength approximately between 600nm to 1040nm which meets the requirement of at least a wavelength in the vicinity of 580nm);

a control unit (the digital camera itself is considered as a control unit) that distinguishes a light source type based on (i) a signal charge output from a first pixel (i.e., G pixel) mounted with the first filter (green filter) and (ii) a signal charge output from the second pixel (I pixel), wherein the control unit automatically adjusts a white balance of the color pick-up image of the solid-state pick-up device (see Fig. 9; col. 1, lines 6-12; col. 3, lines 6-10 and col. 3, line 44 – col. 4, line 11).

Regarding claim 2, as clearly disclosed in Figs. 7 & 8 of Hunter, the fourth filter (the infrared filter) transmits a light having a wavelength of 640nm or more (col. 3, lines 30-44).

Regarding claim 3, it is also seen in Hunter, col. 3, lines 21-24 that the predetermined region (the I pixel region) of the solid-state image pickup device is an invalid region (the I pixel is not used to produce a color image signal but instead it is used for determining a light source type, and is therefore equated to "an invalid region" in consistence with the Applicant's disclosure in which the predetermined region containing the pixels not being used for producing an actual color image).

Regarding claim 11, Hunter clearly discloses that an optical spectral characteristic of the first filter corresponds to green (G), an optical spectral characteristic of the second filter corresponds to red (R), and an optical spectral characteristic of the third filter corresponds to blue (B). See Fig. 5 and col. 3, lines 25-29.

Regarding claim 12, Hunter discloses that the first pixels (R, G and B pixels) are disposed in a valid region of the solid-state image pick-up device (see Fig. 5; col. 3, lines 11-29, and note that "a valid region" is the region containing the R, G and B pixels which are the three primary color pixels being used to produce an actual color image as disclosed. Also note the Examiner's comment in claim 3 for consistency).

Regarding claim 13, as clearly seen in Figs. 6-8 and col. 3, lines 30-44 in Hunter, the first to fourth filters are different from each other in optical spectral characteristics.

Regarding claim 16, Hunter clearly discloses that the control unit adjusts white balance of the color pick-up image of the solid-state pick-up device based on the distinguished light source type (col. 3, lines 6-10).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juen (US 6,459,449) in view of Ishimaru et al. (US 7,006,135).

Regarding claim 5, Juen discloses an electronic camera (Fig. 2) comprising:
a color image pick-up unit (imaging element 22) that picks up a color image of an subject (Fig. 2 and col. 12, lines 58-65);

a signal processing unit (combined circuit blocks 25 & 33) that separates a color signal (by circuits 26 & 27) output from the color image pick-up unit into a color difference signal (G-R, G-B), the signal processing unit multiplying (by multipliers 28 &

29) the color difference signal by a color difference matrix (a color difference coefficient matrix sent from circuit 31), to carry out a color correction (see Fig. 2 and col. 13, line 42 – col. 14, line 4);

a color difference matrix switching unit (combined circuit 31, 32) that stores a color difference matrix for a sunlight and a color difference matrix for a specific light source other than the sunlight (color difference matrices corresponding to a sunlight and a white incandescent lamp are respectively stored in ROM 32, col. 2, lines 32-35, col. 13, lines 59-62 and col. 15, lines 39-42), the color difference matrix switching unit switching the color difference matrix depending on whether the light source in the photographing is the sunlight or the specific light source, to carry out the color correction (Fig. 2; col. 2, lines 32-35; col. 4, lines 6-11 and col. 13, line 42 – col. 14, line 37, wherein if the light source is the sunlight, the correction matrix coefficient circuit 31 switches to a color difference coefficient matrix for the sunlight, and similar switching to the color difference coefficient matrix for the white incandescent lamp if it is detected so that the color difference is multiplied with the color coefficient matrix properly according to a detected light source);

a light source type distinction sensor (the imaging element 22 in combination with circuits 31 and 24) that distinguishes whether a light source in photographing is the sunlight or the specific light source based on a signal charge output from a pixel mounted with a filter (Figs. 3 & 4), the filter transmitting a light having at least a wavelength in the vicinity of 520 nm or in the vicinity of 580 nm (see Fig. 4).

Although Juen discloses an electronic camera (col. 1, lines 14-15), Juen does not specifically disclose that the camera is a digital camera. Juen is also silent about a luminance signal that is separated by the signal processing unit.

However, Ishimaru teaches an electronic camera which is implemented as a digital camera to output image signal in digital format (col. 1, lines 15-17). The digital camera further comprises a signal processing means (Fig. 2, matrix processing section 8) for separating a color signal output (R, G and B) from an image sensor (CCD 3) into a luminance signal (brightness signal Y) and a color difference signal (R-Y, B-Y) so that a display device (9) at a latter can display a color image with appropriate brightness Y (see Ishimaru; Fig. 2, col. 5, lines 64-67). The digital camera would be advantageous in that its digital image signal is less susceptible to noise and is highly compatible with various digital devices for image manipulation/correction than analog counterpart.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electronic camera in Juen into a digital camera in view of the teaching of Ishimaru for improving a signal to noise ratio while allowing the digital image signal to be easily manipulated or corrected by various digital devices, and further separate the color signal output from the image pick-up means into a color difference signal and a luminance signal (brightness signal) for enabling a display device to display a color image with appropriate brightness level for viewing.

Regarding claims 6 & 7, Juen does not explicitly teach that the specific light source is an F6 light source (an ordinary white fluorescent lamp source as defined by

the Applicant) in claim 6 and an F12 light source (a three-wavelength type color fluorescent lamp source as defined by the Applicant) in claim 7.

As taught by Ishimaru, the digital camera is capable of distinguishing a plurality of light source types including light sources from conventional type fluorescent lamps having characteristics of white color normal type, day white color type and daylight color type in addition to light sources from recently developed fluorescent lamps such as a three-wavelength type color fluorescent lamp source (see Ishimaru, Figs. 4, 8 & 13; col. 6, lines 31-54; col. 8, lines 59-67 and col. 12, line 65 – col. 13, line 11). Ishimaru further teaches that, by precisely distinguishing a light source from a plurality of light source types, the signal processing of the camera is improved to prevent discoloration of background or excessive correction of a main object in the direction of a complementary color (Ishimaru, col. 13, lines 35-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to configure the digital camera of Juen to include detection of an F6 light source and an F12 light source in addition to the sunlight and white incandescent lamp so that the white balance and color correction on captured image would be further improved to prevent discoloration of background or excessive correction of a main object in the direction of a complementary color as taught by Ishimaru above.

Regarding claim 8, Juen in view of Ishimaru as discussed in *claims 5-7* teaches that the specific light source includes an F6 light source and an F12 light source. Juen

also teaches the color difference switching unit that stores color difference matrices for a plurality of light sources using ROM 32 to perform color correction so as to switch the color difference matrix according to a detected light source as analyzed in *claims 5-7*.

Since Juen already taught a *fundamental structure* for storing the plurality of color difference matrices and performing image correction according to the light source detected by the camera, it would have been obvious to one of ordinary skill in the art to configure the color difference matrix switching unit in Juen to *additionally* store color difference matrices for the F6 and F12 light sources as additional color difference matrices for specific light sources, and the color difference matrix switching unit would switch the color difference matrix depending on whether the specific light source is the F6 light source, the F12 light source, or the sunlight, to carry out the color correction in view of Ishimaru. Doing this would improve the white balance and color correction on captured image by precisely distinguishing a light source from a plurality of light source types, thereby preventing discoloration of background or excessive correction of a main object in the direction of a complementary color as taught by Ishimaru, col. 13, lines 35-45.

Regarding claim 9, the combined teaching of Juen and Ishimaru as analyzed in claims 5-8 clearly teaches a light source type distinction sensor (also image sensor 22 in Juen), wherein the color difference matrix switching unit automatically switches the color difference matrix based on a result of detection of the light source type distinction sensor (see Juen; col. 4, lines 6-11; col. 12, lines 20-25 and col. 13, line 35 – col. 14,

line 38, and it is noted that a light source type is distinguished by measuring the output signals from the image sensor 22).

Regarding claim 10, this claim is also met by the analysis of claim 9 in which the light source type distinction sensor is incorporated integrally with the color image pick-up unit (the image sensor 22).

5. Claims 14 & 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter et al. (US 6,515,275) in view of Nonaka et al. (US 5,732,293).

Regarding claim 14, Hunter discloses that the control unit distinguishes the light source type as discussed in claim 4 above by comparing output value corresponding to the signal charge output from the second pixel (the infrared pixel) by *at least* an output value corresponding to the signal charge output from the first pixel (R, G or B pixel) mounted with the first filter (Fig. 9 and col. 3, line 44 – col. 4, line 11). However, Hunter is silent about the comparison of the output values of second pixel and at least first pixel is performed by dividing (to form a ratio) the output value of the second pixel (the infrared pixel) by *at least* the output value of the first pixel (R, G or B pixel).

In the same field of endeavor, Nonaka teaches a camera (Fig. 1) including a CPU (10) that distinguishes a light source type (i.e., sunlight, fluorescent lamp, etc.) by dividing an output value (BV2) corresponding to the signal charge output from an infrared sensor (12) by at least an output value (BV1) corresponding to the signal output

from a visible light sensor (14 which is a color sensor) to form a **ratio** (BV2/BV1 shown Fig. 10, step S34) during comparison of the output values for determining whether the light source is a sunlight or a fluorescent lamp, thereby executing an automatic white balance or exposure control accordingly (see Nonaka, col. 4, lines 6-41 and col. 11, lines 56-63).

Therefore, it would have been obvious to one of ordinary skill in the art to implement an alternative comparison in the control unit of Hunter for distinguishing the light source type based on the **ratio** of the output value from the second pixel (the infrared pixel) to the output value from the first pixel (the color pixel) in view of the teaching of Nonaka because the comparison using such a direct ratio would produce a quick and direct comparison result.

Regarding claim 15, as clearly seen in Hunter in view of Nonaka above, the control unit distinguishes the light source type based on the ratio of the output value of the infrared pixel to the **average sum** of R, G and B output values pixels corresponding to first to third filters (see Hunter, col. 3, lines 48-52 and note the analysis of claim 14). Thus, the combined teaching of Hunter and Nonaka for calculating the ratio would also encompass the formula:

$$X4 / (k1.X1 + k2.X2 + k3.X3)$$

wherein X1 to X3 denote output values corresponding to the signal charges output from first to third pixels mounted with first to third filters (R, G, B filters),

X4 denotes the output value corresponding to the signal charge output from the second pixel (the infrared pixel), and k1 to k3 are coefficients (k1, k2 and k3 are **average coefficients** for R, G and B colors as disclosed by Hunter within a super-pixel or an entire image sensor). For example, in a super-pixel containing 4 pixels in which one I pixel and 3 R, G and B pixels are included, the ratio would read as:

$$X4 / (1/3.X1 + 1/3.X2 + 1/3.X3).$$

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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NHAN T. TRAN
Primary Examiner